THE

ANTHROPOLOGICAL REVIEW.

No. XXIV.

JANUARY, 1869.

THEORIES OF HUMAN ORIGIN.

In the opinion of most of the anthropologists of the present day, it is as yet premature to pronounce, or even to form an absolute decision, upon the question, whether man's origin was unique in its occurrence, or accomplished at several points of time or place. During the short course of our investigation of man's real antiquity, facts have but rarely and feebly borne direct witness in the case; collateral evidence, derived from existing characters, is but too liable to be vitiated by party spirit; no wonder, then, that to the judicious anthropologist it seems proper to wait for a larger and clearer mass of testimony before venturing to try conclusions upon a subject so obscure. It may, however, be observed that it is far less difficult to take this position, than to preserve it consistently. Many an unconscious partisan, while professing to discard "plurality" and "transmutation" alike from the vocabulary of his faith, is unable to conceal from others his affection for a chosen theory. We must, nevertheless, admit that in the present incomplete state of our knowledge of archaic anthropology, to pretend to issue a bull decisive of the rival claims of unity and plurality, would savour greatly of the profundity of Dogberry and the temperance of St. Athanasius. It would, indeed, be scant wisdom to consider this problem ripe for complete solution until its premise, the method of organogeny, has been found capable of demonstration. The apparently wide divergence of opinion upon this preliminary point, would seem to argue ill for its speedy settlement; and as long as its students are baffled either by insufficiency of light or by obliquity of vision, it behoves the truth-winner, who weighs polygeny against monogeny, to keep the scale-beam upon the pivot. But while this cautious reserve is perfectly justifiable, nay, laudable, the expediency of maintaining it does not withdraw the license granted by science itself, of adopting provisional opinions in accordance with the data at present supplied by observation or in-

ference. This not only may but must be done by the most circumspect. However ready, however sincere, we may be in protesting that we are not, nor will be, under the influence of such opinions, if they seem to be either the creatures or the creators of hypotheses, in practice we find it impossible to avoid entertaining them. The mind can no more help forming an opinion upon every matter brought within its range, than it can avoid conceiving the ideas which underlie them; and those opinions which relate to questions of scientific importance, demand the most careful expression we can give to them, —the most unhesitating expression consistent with that modesty and forbearance which should be the distinguishing characteristic of scientific utterance. It is not an unreasonable necessity which converts the privilege of the many into the duty of the few, whose judgments have been so tried by their labours as to command universal respect. In some minds, indeed, devotion to practice seems to beget a contempt of theory; but there is probably no man of science, however lofty his position and severe his method of investigation, who can long sit, Jove-like, on his Olympian summit, and from that high but hard seat of fact look down unsympathisingly on the discussions of meaner mortals: who can long hear the appeal of hope or distress made to his purer wisdom, and refuse—

"The fatal nod,
Which rends the clouds, and proves him less than God."

Happily for English, and we will add, true science everywhere, the supremacy of fact is undoubted by the great majority of inquirers; although a high authority in this country has approved, by his example, the censure passed by a great German chemist upon the hero-worship paid by us to the father of the inductive system, that method of philosophising will probably be our safeguard till the progress of decrepitude reduces the intellect to its second childhood, and the mind is again let loose to revel in the revelations of the fancy. But it may fairly be questioned whether a blind devotion to facts, and facts alone, be not in reality prejudicial to the advancement of knowledge, even as a monomaniacal loyalty to a reigning house may be inimical to good government. Science is no miser, to gather from every quarter the isolated truths we call facts, and, after testing their value, to hoard them up from all eyes but its own, and all purposes whatever; but rather a merchant, whose capital is in the hands of bankers, by whom it is put to usance, and made subservient to its own increase and the general good. Comparison, arrangement, correlation, are the proper modes of employing our crude wealth, and constitute a higher plane of science than is trodden by him who is a seer of things,—a describer of phenomena, and nothing more. It is

impossible to have recourse to these without being led by their revelations of the interdependence of facts towards general truths, and along the various lines of facts which they define towards first principles. The more conscientiously this is done the better, not only for general science, but for the individual inquirer. There is more discomfort, more peril in allowing vague second-hand ideas to float incoherently through the brain, than in endeavouring honestly to ascertain how far they may be reposing on known facts, or shaped by recognised laws. But if in the examination of the evidence which presents itself in favour of any plausibility, the student discover that the chain breaks off far short of the bottom of that particular well in which he supposes the truth to lie, and if he be, nevertheless, disposed to drop to the conclusion through the remaining space by the simple force of gravity, he is arrested, awe-stricken by that ominous word,—hypothesis. A rational dread of hypothesis is exceedingly wholesome; but the indiscriminating use which some writers make of the word, as a reproach against the less practically minded, sometimes does more credit to their zeal than to their judgment. The distance is very great between the hypotheses which precede knowledge and defy reason, and those which naturally, if erroneously, rise in explanation of connected series of phenomena. The necessity, which discovers itself in every thoughtful mind, of passing beyond the limits of observation or experiment, and accounting for the relations and sources of the facts acquired, renders it frequently unable to wait for that complete empiricism, without which, satisfactory induction is impossible. This greed for explanation, temperately indulged, is neither unphilosophical, nor, as it has been often declared, futile. On the contrary, it is oftentimes productive of results which mere phenomenal investigation would long fail to accomplish. A speculation, once entertained, acts like Sindbad's cumbersome friend, it compels its victim to labour for its special behoof. Facts are, in reality the only currency in science, but their mint-mark is impressed by criticism; and the individual opinion, whether friendly or hostile, which thus determines their value, is generally a stimulant, frequently a guide, to the search after further riches. The true danger of hypothetical ratiocination lies, not in any intrinsic vice, but in the bigotry it is apt to engender in certain mental castes, and in the stained medium it interposes between the eye and its objects. The student of science, who avoids these evils, may be excused if he takes any and every opportunity of asserting his liberty of holding and expressing provisional opinions, not only as a personal and most valuable privilege, but as the very basis of scientific truth,—the foundation of intellectual progress, as distinguished from the reception of statements

once for all delivered. It may, indeed, be safely said that there is no opinion current amongst scientific men, not even those whose claim to the title "principle" appears most unquestionable, that is not essentially provisional, liable to modification or even revolution, under the pressure of increased knowledge. In the change which is now taking place in the minds of geologists, as to the igneous origin of granite, we have an instructive instance of the want of finality in the most generally accepted doctrines of science; and were we, at this moment, in possession of such a body of facts relating to the generation of life, or to the accidents of human origin, as would compel us to form an inductive decision upon either of them, its justification would differ from the grounds of current hypothetical views on the same subject in degree only. There would be more evidence, and so far the decision would be safer; but like its speculative precursors, it would not be beyond appeal, nor would the appeal be carried to a different court. It may almost be asserted, that every scientific opinion is speculative. With this "right of search" conceded to him, the student of man, who tends to reflect upon the probabilities of human origin, need not be terrified by the opprobrium of "rushing in where angels fear to tread", or of breeding opinions which, like the royal hunchback, are "deformed, unfinished, sent before their time into this breathing world, scarce half made up, and that so lamely and unfashionable, the dogs bark at them as they halt by them." The comparative utility of confining ourselves to experimental research, or of venturing into the latitudes of surmise, is a question which does not admit of a reply which shall be universally applicable, it must be decided in accordance with the individual bent and opportunities of the inquirer.

Certain it is that whether we accord the implied indulgence to speculators, or not, our generation assumes the privilege of theorising to a very great extent. At no previous time has the mind of thinking men been fixed on this subject, of human origin, so generally, so intently, so discordantly, and, on the whole, so rationally, as now; perhaps, because at no previous time has so great a quantity of materials, insufficient as they truly are, been at their command. The interest we feel in it is, no doubt, quickened by the results of modern research; we view it with the daybreak of science upon it, and it is recommended by the novelty and many-tinted beauty of that hour. Yet there seems to be a peculiar fascination about the mystery of human beginnings, which the mind in all ages has been unable to resist. It is the culminating point of cosmogonics universally,—the point of contact at which systems of mythology touch the earth. Yearning to know more, always coexists with effort to be higher;

education and civilisation are nearly synonymous; but in the civilisations of antiquity, the mind was all unconscious of the teachings of external nature, it was therefore compelled to concentrate itself upon the being of whose nature it formed part, and in the belief of its own self-sufficiency, it derived from itself materials for strange autobiographies. Every civilisation had its own racial school of thought,—every school its own metaphysical account of human nature and human origin. The Chinese, the Magian, the Hindoo, the Chaldean, the Egyptian, differed amongst themselves in their conceptions and explanations; they agreed in their inability to look beyond themselves in any other direction than into the supernatural. Later on, the philosopher who had learned to discard the popular symbolism of his race, paid homage to the same imperious question in the schools of Alexandria, Athens, and Rome, with a zeal incommensurate with his materials,—a success which leaves almost everything to be acquired by generations future to our own.

With uneducated man universally, the natural, and therefore trustworthy, mode of accounting for his individual origin is to point to the earth, into which he knows his substance must one day be resolved. Whatever expectations of futurity may have been engendered in his mind, the starting-point of the past is always afforded by the *alma mater*, from whose breast he still derives his nourishment. When the title of a race to its fatherland is in dispute, the strongest evidence it can adduce, the proofs most convincing to its neighbours, are its traditions, that it has arisen from the soil it claims. There is, indeed, a native philosophy which in this respect anticipates the speculations and discoveries of modern science, which assures man that in origin, as in constitution, he is one with the other productions of nature. Neither the savage nor the peasant are capable of conceiving those transcendental ideas of man's nature, which shake the faith of others in his lowly derivation. But though Jew or Gentile involuntarily recognises in the elements around him the materials of his own composition, the mode whereby gross and seeming dead matter becomes invested with the qualities of a moving, thinking being, is to him an unfathomable mystery. Conscious that it is an effect far beyond human power,—ignorant of the subtile and hidden energies at work in and about him, yet convinced that some potent influence must be ever engaged in calling life from out of death,—his mind has no resource but to attribute the work to supernatural agency,—no satisfaction but in stolid content with the unknown. In this phase of its metamorphosis the intellect, if it be able to mount to the level of a pure abstraction, cannot preserve its tenure of an idea so refined To conceive a life-giving being, itself unpossessed of the known ad-

juncts of life, passes the ability of many a cultured understanding. The imaginative faculty by which the untrained mind is characterised, proceeds at once to invest its concrete object with attributes which, though unlimited in extent, are in kind necessarily mere reflections of the faculties and passions of the thinker, who, knowing nothing higher than himself, can conceive of nothing nobler. Hence the constant creation of anthropomorphous gods, and hence, by interdependence of ideas, the self-complacent notion that man himself, with his so-fashioned God-like features, is an exceptional being, to whose origin, as a reproduction of the deity, anything less than the direct handicraft of divinity was inadequate. Man gave to the gods his image,—what so natural as to suppose that the gods had created him in theirs. Mythology testifies to the frequency, experience to the indelibility, of this opinion among various Europasian races. In no instance, however, is it more forcibly illustrated than in the cosmogony of the old immigrants into Canaan. Chaldæans by extraction and early sentiment, they unconsciously turned their faces to the land of the great rivers eastward, in Eden, as that of their nativity, and, exaggerating its natural advantages, pictured it, under divine culture, the most glorious of the paradises in which oriental luxury delighted. Here they beheld the first man of their red stock, the immediate handiwork of their old peculiar gods, the Elohim, whose man-like faculties having been transmitted from themselves, they were compelled to recognise in their Adamic prototype. Nor did the Gentile mythologies of the east differ from that of the Hebrews in another respect,—in their proneness to trace national origins to the gods by the intervention of demigods; sons often opponents of the deities, and after expulsion from divine intimacy, procreators of human races under the guise of local kings,—the groundwork of all such traditions. The general belief that certain portions of each human type had their origin in special localities, is to some extent acceptable to modern science. Theosophical excrescences eliminated, this fundamental tenet remains, and, whatever its truth, accords with the deductions of a large section of naturalists and anthropologists of the present day. There are, however, those whose zoological principles conduct them to the antipodes of the old creed; and in agreement with them, on this point, is a still larger class of men moving in other circles of science, whose opinion is based, not on scientific grounds, but on the unquestioned tradition of a single race. Nor are there wanting some who have drawn from their study of anthropological science conclusions more or less opposed to the idea of multiple points of origin. Time was when the sole object which stimulated faction-fight was the "when" and "where" of human genesis.

Man at that time appeared, to the majority of observers, a creature endowed so differently to all others, that the nature of his origin excited no controversy. Gradually, however, the great issue has been changed; the "how" must be answered before it again becomes necessary to write books showing, from external manifestations, the probabilities or improbabilities of primordial radiation.

The theories of human origin, which now compete for the favour of the scientific world, may be thrown together in three or four classes. Of these, the oldest and most generally respected is that which, accepting the definition of the term "species" as it was settled by the fathers of zoological science, regards it as representing, not merely an established ordinance of nature, but a "divine idea", and attributes the generation of the forms included within its impassable limits, to evocation out of nothing by the fiat of the First Cause. With every desire to avoid disparagement, it may, perhaps, be said that this opinion is held by those who have either paid no particular attention to biological inquiry, or are under the influence of extra-scientific prepossessions. The same tenacious faith in the reality of the thing called species is, however, compatible with a totally different explanation of its origin, proceeding from men who claim to reason only on physiological grounds. According to this account,—which is, as far as its present office is concerned, the materialistic,—the primary origin of species is simply due to those chemico-vital energies of matter which are known to cause the subsequent development of the individual, and continuation of the specific organism. But, of late years, the sharp outlines which defined the idea of a species, have nearly faded from the minds of many able investigators, and in the school which they have founded, the word remains as little more than the convenient expression of the systematist, bearing the same value in respect to nature as that of genus, family, or order. They who sin most deeply against the venerable and, as we are warned, most fundamental principle of zoology, are those who have undertaken to explain that gradual elevation of organised forms which is undoubtedly visible, on the large scale, to the geological eye. If we must believe the transmutationists, as they are somewhat irreverently called by their opponents, no distinct origin whatever can be assigned to the conventional group termed a species. Since the hypothesis with which we are required to start endows every organism with a tendency, or at least a potentiality, of changing its form under the pressure or permission of changed conditions, and since conditions are always changing, the species of yesterday may, or rather must, become the different species of to-morrow. Accepting this explanation of the rise of existing species, in whatever sense the term is

left to us, it is clear that the actual origin of them all has to be sought at an immense distance of time and organisation. But when we yield to the guidance of the theory, and are conducted down the long line of life until we reach its ultimate limit,—when we contemplate our almost structureless first parents, and ask what gave them birth, our Mentor is silent,—it is not as yet the province of development to trace the origin of the living point. If on this subject we question the advocates of that theory, they break up their bar, and speak as theologians or materialists. Some of them, however, are among those who endeavour to steer a middle course between these extremes. Believing that reasons can be adduced which, though not experimental, are sufficient to prove the existence of immaterial, or at least insensible being, conjoined with ponderable matter, they are led to ascribe, with more or less confidence to this "principle of life", the production of living beings, as a consequence of its association either with preexisting organisms, or with so-called inert matter ripe for organisation. The life-principle itself is considered to be by some the creation of, by others an emanation from, the Universal Spirit. The organic matter necessary for its sublunary manifestation has, in controversial exigency, been declared to be the primitive form of matter itself. Both life and organisation are thus created mysteries, totally beyond the pale of human comprehension. Unless some other theory be found to satisfy the inquiring mind, it will be wisdom to accept this without attempting to understand it, until that time arrives—which appears to be anticipated by a celebrated anatomist—when we shall possess "powers of penetrating the problems of zoology, so far transcending those of our present condition, as to be equivalent to a different and higher phase of intellectual action, resulting in what might be termed another species of zoological science."* Meanwhile, it may be as well to consider whether all other theories are so palpably false as to render it necessary for us to wait for more elaborate brains.

The general and the specific origins of life are, in reality, two distinct issues; but the considerations relevant to each are so intimately connected, that it is not advisable to attempt to give them separate attention.

Since the theory of development denies the definite origin of species, on the one hand, and on the other does not profess to throw any light upon the primitive birth of life, the question compounded of these two particulars rests, in the first place, between those who think that the production of life required the immediate action of the First Cause; and those who consider that the natural forces, which

* Owen, *Comp. Anat. of Vert.*, preface, xxxvii.

we are accustomed to call secondary causes, were equal to the task. Though we may possibly shrink from so blunt a statement of the matter at issue, it is our duty, as candid inquirers, to look it boldly in the face, and decide the question impartially, whatever sacrifice of early prejudices the decision may call upon us to make. We have to determine between creation, in the ordinary acceptation of the word, and evolution,—to say whether the production of living organisms, by the immediate act of the Deity, be a proposition probable in itself, and consistent with the present state of knowledge; or whether the organic has been evolved, by natural processes, out of the inorganic. It does not appear that any *à priori* reason, arising out of the nature of organisation, can safely be given in favour of the former of these opinions. The line of demarcation between compounds of the elements in an organised and unorganised state, though not absolutely obliterated by the modern chemist, has been of late greatly attenuated; their comparative rank in the system of nature will certainly not justify the idea that one composition may be readily effected, the other be totally impossible without Divine interposition. If, therefore, we assume the position of advocates for organic creation, we must fall back upon extraneous reasons in its support. These appear to be two,—the authority of revelation, and the concurrence of human tradition as to human origin; but these two are in reality one. If the former prove, on sober reflection, to be untenable, the latter at once falls to the ground, since no man could know that he had been created by the direct exertion of the Deity, unless it had been revealed to him; the concurrence of tradition, assuming that there is such a thing, testifies, therefore, not to the fact, but to the belief in the revelation of the fact.

We will assume that this belief has spread from a single source, and that the biblical account is an inspired production,—we will consider it to have been, as it undoubtedly was, intended to be taken in its literal sense. It is at the present day universally conceded to science, by sensible interpreters, that the bible was never meant to teach natural history, or any other kind of secular knowledge, formally or indirectly. On such subjects, its statements—sometimes correct, sometimes incorrect—were always adapted to the intellectual acquirements of those to whom they were addressed, and necessarily so, for otherwise they would have been utterly unintelligible. Whether we are of opinion that Moses was the inspired author of the whole of the Pentateuch, or that its first section, the *Berayshith*, is composed of narratives from Chaldaic pens still more ancient, in either case the genesis was described to people who—in common with all those, especially of the east, who claim a national ancestry—attributed their origin

to the gods. Before an audience totally ignorant of anything relating to the subject but themselves and the ultimate operator, to refer to creative processes would have been not merely useless, but an infraction of the scheme of inspiration, which we now know excluded mere philosophical knowledge. No doubt a Creator can be imagined to work without means; but the question is not what he might have done, but what he did; and the silence of the Bible is an argument neither for nor against the use of whatever means were naturally required for organising purposes. Unless intermediate agencies are expressly referred to, we have a mental habit of vaulting over the interval of thought which should be occupied by them, and speaking of an effect and its ultimate cause as directly related. At the present day, for example, coroners' juries, who always proceed on the principle of taking *omne quod ignotum pro magnifico*, would, if required to sit upon a new human production, solemnly pronounce "born by the visitation of God"; and everyone who believes in a First Cause may, popularly speaking, refer to it as the original producer of his own and other organisms, even though he be persuaded by post-Chaldaic science that a train of secondary causes have, in reality, intervened. The ascription of life-production to the *Elohim* immediately, only proves that the Jews or Chaldeans were not *savans*. If then, tradition, without previous revelation, is of no value, and revelation in that age of the world necessarily omitted unintelligible particulars, the mode of organised production is left an open question, to be freely discussed even by those who are sincere believers in the divine legation of Moses. But we shall here be met with the assertion that, whatever may be the case with other parts of the world of life, man stands upon a totally different footing; in other words, that the secondary causes, which might have been sufficient for the generation of brute nature, though themselves emanating from the Supreme Good, were altogether unable to form an image of that Good. This is a perfectly gratuitous assumption, to which replies in abundance may be concisely given. In the first place, if man's superiority be held to consist in a special immaterial principle, it may be said that the Creator was as able to produce the immaterial out of the material, by certain means provided by himself, as he was to produce the material out of nothing by other such means. It is equally reverential to the First Cause, and more so, to believe that he worked by his own ordinary laws, as to suppose that he created man by special patent. The Jewish record nowhere asserts explicitly that there is a difference between man and lower animals, so essential as to require a different source of derivation. The origin of the phrase "image of God", has been already explained. Being thus left dependent upon

investigation, we find that the difference between organised and unorganised compounds is insufficient to render the conversion of the one into the other supernatural, although at present it may be superhuman. As the tendency of discovery is to identify the forces which regulate their respective existences, we have therein presumptive evidence that the forces under which they commenced were radically the same. We know nothing of production without a natural medium; and it is therefore unphilosophical, without necessity or proof, to attribute organisation, human or other, to causes beyond experiment. The advocates of the sufficiency of natural modes of organisation, expose themselves to the declamatory charge of seeking to deprive the Deity of the glories of creative work. The odium is utterly undeserved; for until it is asserted that matter could be self-creative, and the forces belonging to it self-productive, the true dignity of the First Cause remains intact,—nay, increased by the superior homage we must pay to the agent endowing matter with the power of accomplishing its highest destinies.

The most sincere upholder of Divine Intelligence may therefore, without repugnance, take part in the inquiry now remaining, whether organisation be the product of efficient agencies, alien to those which cause the lifeless combinations of matter; or whether both of these may not, with better reason, be ascribed to causes identical in their nature.

Of late years, a very important change in the mode of viewing the phenomena of life has taken place in the minds of those who, being most intimately acquainted with all that relates to the living tissues, are most competent to form a reliable judgment. Like all scientific truth, the doctrine of vital operation, which is now commanding the assent of the physiological world, has passed through a severe ordeal of crimination, in addition to the more legitimate trial of criticism. It has, perhaps, been peculiarly unfortunate in its power of touching to the quick the prejudices of that class of scientific men who are unprepared to substitute new inductions, however palpable, for old habits of thought, however unphilosophical they may be demonstrated to be. It is not difficult to reach the source of the hypothesis which, until a comparatively late period, occupied the place of an intelligent comprehension of the nature of vital reactions, and thereby greatly impeded physiological progress. Aristotle conceived, first, that the whole world was provided with a principle of vitality,—an intelligent being, or *Ens*, whose office it was to superintend the origination of every form of organisation capable of earthly existence, and so to regulate the proceedings of each as to produce those harmonious results which have been the theme of admiration to reflective man in all

ages. Second, that an emanation from this universal "soul of the world" was localised in each distinct organism, forming a subordinate soul, to which was committed its individual welfare through all the stages of its life, and which he seems to have regarded as the cause, both efficient and final, of its beginning, its perfection, and even of its corruption. But the animating principle of the individual organism was not, according to the great philosopher, a homogeneous entity, but a composite being; one portion of the whole *psyche*, the *nous*, or mind, being so far separable from the rest as to be capable of existing independently of the body: though, during life, in intimate union with the psyche, and forming with it the total "animating principle." These two beings, thus invented, were received by philosophising Jews, adopted by Roman sages under the names Anima and Animus, consecrated by the Fathers, illuminated by doctors of the dark ages, and, finally, appear to the popular mind—innocent of knowledge of Greek conceits—as expressions of divine truth. But though the distinction thus made between the compound *Ens*, in charge of the whole man, and the constituent which was invested with the glories and responsibilities of its spiritual existence, has been handed down to our days, and accepted in the popular doctrine of a conjoined "vital principle" and "mental principle", building up and actuating the body, its adaptation to the revelations of science has not been effected without extensive modification. It is now rarely held that the two "principles" are in their nature even temporarily identical. The different results of their labours in life, proved to the minds of those who believed in them that they were separate beings. The "vital principle", raised to an independent existence in the body, naturally received a further accession of dignity; its adherents could not resist its logical claims to be considered capable of preserving its individuality when its connexion with the body and the mind had ceased; and though some hesitated to go so far, and contented themselves with vague ideas that its existence was, in some way or other, dependent upon that of the body, the general result was (according to notions now in course of explosion) that the body was patronised by as many tutelar godlets, in proportion to its wants, as were the contending hosts of the Iliad; and the products of the dissolution of this imaginative partnership could be described in Horatian verse,—

> "Terra tegit *carnem*, tumulum circumvolat *umbra*,
> Orcus habet *manes*, *spiritus* astra petit."

The whole doctrine of an "animating principle" comes to us, as we have seen, from the porticoes of Athens; but the innovation which conferred immaterial rank upon the "vital principle," arose from an unwarrantable, though oftentimes unconscious, abuse of terms in

modern physiology. In the progress of research, numerous phenomena presented themselves to the investigator of the constructive, adaptive, and reparative properties of the tissues; and, as they accumulated, it became more and more obvious that they were all produced in obedience to law. It was assumed that all were referrible to one and the same energy, and as none of the known forces of external nature appeared competent to bring about effects so mysterious, a convenient expression was required, not, indeed, to define the nature of their cause, but, as was professed, merely to serve as a nominal bond of union, and to obviate the necessity of periphrasis. The metaphysician (sometimes the same person with the physician), was at hand with a long established term useful for the purpose, and "vital principle" was transplanted into the language of the physiologist, who constantly protested that he did not employ the term in any theoretical sense, but merely as a provisional name for a set of reactions of whose causative stimulus he was ignorant. The process of transferring to a denomination the properties and powers of a concrete being was once more strongly illustrated; even in the course of a single volume, "vital principle" forgot its modest rank as a *vox et præterea nihil*, and asserted its substantiality as "the vital principle," to be ultimately debated about and fought for with all the reverential zeal inspired by a dogma. It was not, however, to be expected that the acumen of science would long be imposed upon by a feat of verbal juggling; not only has the expression been reduced to its pristine insignificance by frequent exposure of the unphilosophical nature of the hypothesis built upon it, but the necessity of using it at all has been swept away by the discovery of the protean modifications of which the material energy is capable, by the recognition of the slight difference between some products of the laboratory and others of the organising processes, by the knowledge, that in both cases the same combinations may become the subjects of analysis and recomposition, though the products may be different; that the same polar disturbances ensue from chemical and vital reactions; that the processes are carried on in dependence upon the same physical properties, as elasticity and endosmosis, and that there is no such a thing as "inert matter," motion being the common property of inorganic and organic substances. It is true that a living cell has never yet been produced by the chemist; it is equally true, that a crystal has never been formed by magnetism, yet, we know that magnetism is but a modified form of galvanism which readily determines the formation of crystals. It is evident, therefore, that the general tendency of observation is to identify the physical and vital energies with each other, and on the other hand, no observations have been recorded essentially antagonistic to that identity.

This progress, in our conceptions of the nature of vitality, produces, amongst others, two effects important to our present purpose. Any interest we may feel in prosecuting the investigation of life to its fundamental issue is greatly invigorated, and at the same time, the probability of obtaining from that investigation a reliable result is increased or rather created; while vague notions that life processes are due to the power and intelligence of an immaterial medium were in the ascendant, it was clearly absurd, not to say blasphemous, to attempt to trace the stream of life upwards, in time, with intent to explore the hidden springs of its origin. Now, however, that the conviction is becoming settled, that life in its several organic manifestations is but the natural product of natural operations, we may, perhaps, be allowed to pursue our course uninjured by invectives such as those which have been hurled against the organic chemist for presuming to stretch his profane hand towards the sacred fount.

But, however fully persuaded we may be by physiological facts, that there is nothing in the nature of vitality which requires the intervention of a special agent, there is another class of observations which may tend to confirm, though, in itself, insufficent to form that judgment. Few subjects have excited greater interest, perhaps enthusiasm, among a certain class of experimenters, than the supposed possibility of organic formation without the preexistence of a germ. It is unfortunate for the credit of science, that the term "spontaneous generation" should have been adopted for the expression of the expected phenomenon. There are, undoubtedly, many impressed by it with the notion that science thereby attributes to organisation a power of volunteering itself into existence; whereas, all that is meant, is the possibility, that under certain conditions artificially procured, vitalisation may be set up in unorganised materials independently of known methods of germination. That such must have been, or still may be the case, more or less frequently under conditions supplied in nature, is the only logical conclusion possible to those who see in life developments but the evolution of a material force, for no reason can be given why the primal initiation of life should have taken place under laws different to those which govern its after course. The only permissible doubt, therefore, is whether those natural conditions can be reproduced by experimental arrangements. This is a problem surrounded by peculiar difficulties, in number and magnitude sufficient to tax ingenuity to the utmost. The experimenter, in brief, has not only to provide the necessary means for the production of organisms, but to effect this in such a manner as to satisfy the most captious objector that germs of all kinds were utterly excluded. It would be rash to affirm that the two requirements will never be

fulfilled; it would be equally rash to say that the approach made to the realisation of the object in view has in any instance been sufficiently near to justify the assertion of its practicability; of the many examples of extragerminal production adduced, few, indeed, have been subjected to a competent scrutiny, but the common result of these examinations—vitiation of the conclusion sought by imperfect isolation from germ-bearing media,—establishes a presumptive case against the rest. The materio-vital theory has not, therefore, received from this method of investigation an absolute demonstration of its truth; it is, indeed, probable that its general acceptation will be the result of observation rather than of experiment. But, though a decisive answer has not been given in its favour, a candid examination of the cirumstances in which many of the experiments have been conducted, leave little room for doubt that the probabilities of the presence or absence of germs were in those cases about equal; while in a few others, the balance of evidence seems to preponderate on the side of the latter. Even if we hold that the whole of such experiments have hitherto offered no encouragement to those who relate vital effects to the productions of other material reactions, the burden of proof to the contrary, rests with those who see in the asserted failure a refuge for their destitute "vital principle." On the other hand, whatever practical reason for doubting the truth of that assumption arises from the investigation, it gives the whole of its authority to the opponents of the immaterial hypothesis. It may, indeed, be objected that the most decisive instance of extragerminal production would not, of itself, overturn the opposite opinion, unless it could be shown that the immaterial agent itself was incapable of coming into practical existence together with and under the conditions necessary to the organism appropriated to it. It will not, however, be necessary to discuss such a question seriously, until the mode in which a "vital principle" originates or obtains a settlement within an organism be definitely conceived, reasonably established, and generally accepted—until we are educated to perceive, either, that it is by a creative act, as occasion requires, by the incarceration of one of the principles supposed by some to be floating in the air ready for use, by the continuity of the "principle" of the new born with that of the parent, or by union of the male "principle" with that of the female,—while those who are versed in the natural history of these creatures, find these little matters beyond their powers of explanation, persons of feebler imagination would not be justified in attempting the solution of problems with which they have no concern.

When, then, we become acquainted with the original source of the popular and lately scientific notion, that there exists within the body

an immaterial medium of organic life,—when we perceive that the hypothesis, at its introduction into physiology, did not even pretend to a foundation in fact, that it is surrounded with difficulties and absurdities, and that it is an utterly unnecessary mystery-making about matters purely inductive and referrible to known laws,—we cannot hesitate to condemn the hypothesis as wholly unworthy of the present state of knowledge, and further, to ascribe the origin of organisms to the modification of material force which produces the subsequent effects of generation and development. It is by no means necessary that we should be at once able to determine the exact nature of the vitalising force or forces, or to point out the other modifications of force to which it is most intimately related. We are informed by the sun's rays of the quarter in which it will rise, long before we can examine its disk; and other forces, whose modes of action are now fairly known, long baffled the investigators of their correlation. In the present case, the effects are infinitely more complex and diversified, and partial ignorance of their source is not a reproach, but a stimulus; while confidence that we are seeking in the right direction, is a strong encouragement.

But if we accept without hesitation the general truth of the proposition, that organic beings are the effects of some form of the physical force, we naturally ask, Does this offer a satisfactory explanation of the origin of mankind? Can the production, as well as the maintenance, of every degree of organisation from the vegetable monad to man, be attributed to this as its direct cause? It is from the combined testimony of geology and physiology that we can alone hope for a reply. The life-history of the earth, revealed by the former, assures us in unambiguous terms, that the life of the individual is, in its great features, repeated in the career of all natural aggregates, from the least in extent to the greatest of those whose whole course can be traced in the deposits. Each of these is seen, more or less distinctly, to have had periods of life,—cycles of development, following each other in regular succession, and homologous with those of our own birth, immaturity, adolescence, and prime, with their constant sequelæ, decay and dissolution. If, then, at several points in the existence of such groups, we perceive that it has undergone changes, which are attributable only to processes similar to those which bring about similar results in the individual life, it is difficult to avoid believing that the commencement, both of the individual and of the group, has been effected by the same methods. The life of the individual, at its origin, is simply the vitality of a single cell, which is either gifted with the faculty of so modifying the action of a uniform vital force, as to allow the development out of itself of a

perfect exemplar of the species to which it belongs, or being itself passive, of receiving the impression of whatever modification of that force may be necessary for such development. The question is, whether the life of the first individuals of a natural aggregate commenced in its adult or primitive cell condition ; whichever conclusion we adopt with regard to the unit, should be transferable to the numeral. Among those who recognise some form of material energy, whether purely chemical, physical, or resulting from any of their combinations as the efficient cause of life, some are of opinion that organisms have been brought by it into existence in their highest stage of development. But when we contemplate the exceeding complexity of structure which obtains in animals comparatively low in the scale of organisation, and the great diversity in the functions and products of their tissues, when we reflect that there is no real analogy between such combinations of many proximate principles and the constitution of the most intricate substance obtained artificially by organic chemistry, we cannot suppose that so vast an amount of elaboration has been accomplished by a single process. This would be to imagine an extraordinary substitute for that gradual building up and consolidation of the fabric which require for their completion continuous operation during definite periods of immaturity. Such an occurrence appears rather supernatural ; and, unless this is a mistaken view, it is necessary to withhold assent from the doctrine that mature forms of organisation, at least of the higher types, have been produced by the direct action of physio-chemical forces. It seems as reasonable to imagine that the steam engine in its working state is a single casting of different metals, effected by a mode of operation which is certainly employed in the formation of any one of its parts. Rejecting this idea as inconsistent with the constitution of adult life, we cannot, of course, regard any other stage subsequent to the initiatory one as more probably that in which formative action was primarily set up. It is, indeed, only in rudimental structures that we find the simplicity which alone appears capable of proceeding from extraneous sources. We have now to consider how this view of organogeny can be extended to group-origin. It may be said, that if we refer life origin to the germinal cell of the individual, and regard the adult as its development, the same idea must, by our own analogy of the individual to its group, be extended to all natural aggregates: that is ultimately to the whole animal, and, indeed, vegetable kingdom. A conclusion, which is really that of the Lamarckian theory, pure and simple: a primal monad at the base of the whole series. Such a termination of the argument is certainly plausible, and were the theory of uniform development from the lower to the higher more

agreeable to observation and consistent with principles at present accepted as sound, we should not hesitate to adopt it. But geology bears unflinching witness to the fact, that the progression of life forms has not taken place by consecutive steps of ascent. Certain forms, or groups of forms, persist in making their appearance before their proper time, and disappear before others inferior to them obtain their systematic characters. Zoology, likewise, testifies that the view of natural affinities on which the doctrine really leans is not tenable. Organisms are not capable of being arranged in that linear order which would appear to be the necessary result of the continuous eduction of one structure from another. It, moreover, is a contradiction of our ordinary conceptions of the operations of nature, to suppose that the production of life has taken place but once in the world's history. Our experience of nature, the foundation of all reasoning upon such matters, tells us that frequency, repetition, is the law of laws; that the material forces are continually at work, and their effects constant. Finally, we must dismiss this explanation of group-origin in the form usually presented, because, amidst all the destruction of old prejudices and transmutation of new, caused by discussion for or against the theory, permanence of type during definite periods stands erect and unharmed; no fact inconsistent with its elasticity, by which is meant its power of stretching and returning to its original condition, has been adduced from the past or in the present, able to shake our confidence in its truth.

But what is the alternative? If we say that there has been but one mode of life production for man and brute by the action of material forces; if we say that the result has not been a state of maturity, but the first steps of specific life; if we further say that the difficulties in the way of believing that the evolution of life on the large scale can in anywise be considered a uniform ascension, are insuperable; then it would appear that the sole resource left to us is to adopt the presumption that the conditions necessary for organised life have been so arranged as to allow germs of a special nature, that is capable of evolution into special forms, to be produced and sufficiently developed for the ultimate establishment of the group whenever its existence in the natural system became requisite. Have these germs arisen in dependence upon, or unconnected with pre-existing organisms? There is a very obvious objection to the latter supposition. Recurring to the ordinary method of individual origin, we know that the early stages of development out of the germinal cell take place in most, if not in all cases in continuity with, or at least in attachment to cells of the parent. If, then, life were first established in an independent germ,

how could embryonic development have gone on without embryonic surroundings? In the case of an inferior type, especially one of those inhabiting fluids, it is not extremely difficult to suppose that a germ might be produced and the ovum developed from surrounding materials sufficiently to enable the new animal to commence its automatic existence. It would not be altogether safe to say that in the case of some oviparous classes the process would be altogether impossible; but amongst viviparous animals, and those whose egg-born young depend upon parental support, such an origin of new species seems quite inadmissible. By way of evading the difficulty, much might, perhaps, be said about our knowledge of numerous animals which are evidently embryonic stages of higher structures, although they pass through the complete cycle of life; the metamorphic changes taking place in many invertebrates might similarly be quoted as examples of fœtal development in a separate state. But in the latter case, the caterpillar and butterfly, for example, are one and the same individual; in the former, the proteus for instance, is embryonic only in a general sense—it is an unchanging type of imperfection. These examples, therefore, are very far from removing the difficulty before us. In reference to man, for instance, we should have to assume that there have at times existed human embryos and infants in the literal sense, so situated as to be able to pass in the usual methods and periods from that state into one of maturity. It is, of course, unnecessary to say that observation and reason are alike wanting in support of such an idea; and, indeed, it seems to involve a greater miracle than the immediate production of an adult by external agents.

If the chemico-physical theory prove itself inadequate to account for the rise of both the germ and the adult, we have, as it would seem, no resource but to attribute specific origin to some process of organic evolution. The conclusions to which we are led by the theory of development as it is usually presented, are as we have seen, too inconsistent with the facts of Zoological science to permit their acceptance. The great principle on which the theory is based, the tendency to vary, is within due limits a sound one; the companion principle, the tendency so to vary as at the same time to elevate by permission of circumstances, is at present open to great suspicion. That a disposition, or an impulse to vary does exist in the organised world in much greater force than was formerly admitted by naturalists, is incontestable; it is not, however, its prevalence, but its intensity which forces it upon our attention. The indubitable fact, that it is sometimes manifested very strongly, has given birth to the hasty assumption that it is the common property of organised life; but

the truth seems to be, that it is possessed only under certain conditions of life. There are numberless cases in which not the slightest tendency to throw off varieties can be detected. The suggestion that this failure is due to uniformity of circumstance, is not only purely hypothetical, but rendered very improbable by the fact, that a species will frequently exist under different local conditions without exhibiting a proneness to vary. The presumption that there is a centrifugal force constantly tending to enlarge the organic radius rectilineary, and compelling every species to struggle to differ from its prototype in the ascensive direction, appears to be without sufficient foundation in nature. It is an unnecessary hypothesis if a probable account can be otherwise rendered of the variability which is displayed by certain groups. If we carefully and comprehensively examine the natural history of most of those species which possess the greatest amount of variability, we find that this tendency is but one of several concomitant characteristics analogous to, if not identical with, those which belong to the individual at the most vigorous period of its life, that is, at the most typical phase of its personal development. But the naturalist is well aware that in an organised group the most typical portion is by no means the highest in point of general structure. If, then, we concur with the advocates of development so far as to derive the origin of one group from a germ given off by another, we are forbidden to look to the most highly organised part of the parent group as the source of the new development; but to that which is the most mature relatively to the other members of the group, and by virtue of its maturity, the most procreative. May we not suppose that the power normally possessed by the most typical form may occasionally be intensified by extraordinary vigour, or by some constitutional peculiarity; and that germs of higher, but cognate characters may be thrown off when requisite from the surface of a type, while the type itself is (not transmuted, but) passing onward though its regular stages of life. Looking at variability as one of those physiological characters of adolescence which comprise amongst them a greater amount of adaptability than is possessed at any other period of existence, we cannot regard its possible effects in pushing out new types as eventually dependent upon external conditions. The typical characters of each natural group are retained even by those species whose decadence shows it to be in the last and feeblest period of its existence—a conservatism which appears incompatible with the elevation of a type by transmuting influences around it. Few, indeed, will dispute the truth of the principle which lies at the base of the development theory; perhaps no one, from the biblicist to the materialist, will deny that some force is, or has once been at

work whose effect upon the general economy of life is ascensive change—the effect is patent, it cannot be causeless. In the ordinary view of development, we contemplate this force acting directly upon the animal through the channel of external conditions,—we are told, that of the numberless accidental varieties which every type may constantly produce, those only succeed which happen to be suitable to surrounding circumstances, somewhat as though the flight of the rocket were generally due to the chance spark from a catharine wheel. The theory has many recommendations; but it creates more difficulties than it explains. If, instead of a lawless appetite for mutation, it be possible to substitute a power of expansion exerted in, and as an element of, the prime of specific life—if we may reject the fortuitous slave of local circumstances in favour of an expanding germ of the old form, evoked in consequence of its general congruity with the life conditions and fellow beings of its period, we shall, perhaps, have lost nothing that development can give us, and gain much that is wanting to Darwinism,—the countenance of physiological experience, and the satisfaction of recognising order in the operations of life. To some, it may appear a recommendation of this mode of accounting for specific origin, that it relieves us from the necessity of ascertaining each minute grade of ascension between forms next akin and yet far removed. The germ, which, from whatever cause receives an impulse towards permanent expansion may be thus enabled to produce a being considerably higher than its parent; and, as in the case of the lowest existing man and the highest present ape, intermediate forms may have been passed over in the embryo. But the probability that such has really been the mode of human origin must depend very much upon the age to be attributed to the earth and apes of the present day. Is that aberrant group immature or decrepid? If it has buried no records of a life superior to that in which we now observe it; if the number of its individuals, varieties, and species has never been higher than now; if its elasticity under the strain of climate was never greater; it is difficult to suppose that it has had vigour to throw off a new type so far in advance of itself. But the present apes give tokens that they are in the stage of natural decay; the scanty relics of old world quadrumana do not indicate a more feeble life; and it is, at least, impossible to say that the present groups are not the perishing remnants of the ape-folk of pliocene forests. Yet, until we have learnt that the group enjoyed its meridian of life when man first placed his heel fairly on the ground, all relation of origin between the two is merely conjectural, incapable of being moulded into a well favoured opinion. In such uncertainty, however, all views of human origin, except those of unreason, are at present involved. The tangled

skein of nature will require many a year of patient unravelling before we can trace the threads of life from end to end. It will be well, in this behalf, to do our spiriting gently. Prejudice and loud assertion make lingering haste—they pull out the slack but tighten the knots; modesty is our "only wear," work and wait our safest watchword.

THE FORMATION OF THE MIXED HUMAN RACES.*

By M. de QUATREFAGES, Professor of Anthropology in the Museum of Natural History, Member of the Institute, Honorary Fellow of the Anthropological Society of London.

The Crossing of Races in the New World.—"South America," says M. Perier very justly, "is the great laboratory of the modern mixed breeds or hybrid nations." Let me add that Central America and Mexico, in this respect, may be placed upon nearly the same footing as the more southern countries. It is especially interesting, then, to study out in all their details the results of the vast and varied experiments which have been worked out, or better still, which are now only commencing upon this extended field. And it is precisely this that M. Perier has done. He has collated an immense number of papers, and has examined the questions which they suggest. He has considered successively the origin of the Mestizos, the Mulattoes, and the Zambos, but we cannot follow him into all these details. We will content ourselves with some general observations.

M. Perier recognises the fact, that in the crossings of races the inferior is bettered, and acquires a relative degree of superiority. But, according to him, this elevation is purchased only at the price of a degradation of the superior race, so marked that in fact there is a deterioration in the population.

Now, even by taking the facts as he presents them, I see no reason for accepting his conclusions. Evidently, M. Perier, in forming his judgment of the mixed races, takes for his standard of comparison a European of pure blood, as he is, or rather as he onght to be, among ourselves. He fails to bear in mind the real point of departure or standard of comparison, i. e., the Creole. If our author had only

* This article is an extract from the *Report on the Progress of Anthropology in France for the last twenty years*, made by Prof. Quatrefages, at the request of the Minister of Public Instruction.